REMARKS

By this amendment, claims 25 and 32 have been amended. Accordingly, claims 1-39 are currently pending in the application, of which claims 1, 7, 11, 21, 25 and 32 are independent claims.

In view of the above amendments and the following Remarks, Applicants respectfully request reconsideration and timely withdrawal of the pending objections and rejections for the reasons discussed below.

Rejections Under 35 U.S.C. § 103

Claims 1, 2, 6, 21 and 22 stand rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over U. S. Patent No. 5,085,973 issued to Shimizu, *et al.* ("Shimizu") in view of U. S. Patent No. 5,754,263 issued to Akiyama, *et al.* ("Akiyama"). Applicants respectfully traverse this rejection for at least the following reasons.

With respect to claims 1, 2 and 6, independent claim 1 recites:

> "1. A substrate for a liquid crystal display, comprising:
> an insulating substrate;
> a transparent electrode formed on the insulating substrate;
> a black matrix formed on the transparent electrode; and
> a protrusion formed on the black matrix."

For example, Fig. 2 of the present application shows a common electrode 220 formed on the substrate 200, the black matrix 230 formed on the common electrode 200 and the protrusion 250 formed on the black matrix 230.

Shimizu discloses, in Fig. 1, a black matrix 2b formed on the substrate 1, and the transparent electrode 2c formed on the substrate 1 and the black matrix 2b. It should be noted

that the substrate 1 is not formed on the black matrix 2b because the black matrix 2b is formed by depositing a black matrix layer on the substrate 1 and subsequently patterning the black matrix layer to form the black matrix 2b. Similarly, the black matrix 2b is not formed on the transparent electrode 2c because the transparent electrode 2c is formed by depositing a transparent conductive layer over the color filter 2a and the black matrix 2b. Thus, Shimizu fails to disclose or suggest "a black matrix formed on the transparent electrode" and "a protrusion formed on the black matrix", as claimed.

Akiyama discloses the transparent signal electrode 63a formed on the substrate 62a. However, Akiyama does not disclose or suggest "a black matrix formed on the transparent electrode" and "a protrusion formed on the black matrix", as claimed. Since none of the cited references discloses or suggest these claimed feature, it is submitted that claim 1 is patentable over them. Claims 2 and 6 are dependent from claim 1 and hence would be patentable at least for the same reason.

With respect to claims 21 and 22, independent claim 21 recites:

> "21. A liquid crystal display, comprising:
> a first insulating substrate;
> a transparent electrode formed on said first insulating substrate;
> a light-blocking layer formed on said transparent electrode and made of metal; and
> a protrusion portion made of an organic layer and aligned with the light-blocking layer."

For example, Fig. 2 shows the common electrode 220 formed on the insulating substrate 200. The light blocking layer 230 which "is made of a conductor such as chrome" (paragraph

[0051]) is formed on the common electrode 220. The protrusion portion 250 formed of an photosensitive material is aligned with the light block layer 230.

As previously mentioned, Shimizu discloses, in Fig. 1, a black matrix 2b formed on the substrate 1, and the transparent electrode 2c formed on the substrate 1 and the black matrix 2b. Thus, Shimizu fails to disclose "a light-blocking layer formed on said transparent electrode and made of metal" and "a protrusion portion made of an organic layer and aligned with the light-blocking layer".

Akiyama discloses the transparent signal electrode 63a formed on the substrate 62a. However, Akiyama does not disclose or suggest "a light-blocking layer formed on said transparent electrode and made of metal" and "a protrusion portion made of an organic layer and aligned with the light-blocking layer". Since none of the cited references discloses or suggest these claimed features, it is submitted that claim 21 is patentable over them. Claim 22 is dependent from claim 21 and hence would be patentable at least for the same reason.

Accordingly, Applicants respectfully request withdrawal of the 35 U.S.C. § 103(a) rejection of claims 1, 2, 6, 20 and 21.

Claims 7-9 stand rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over Shimizu in view of Akiyama and further in view of U. S. Patent No. 5,633,739 issued to Matsuyama, et al. ("Matsuyama"). Applicants respectfully traverse this rejection for at least the following reasons.

Independent claim 7 recites:

> "7. A method for manufacturing a substrate for a liquid crystal display, comprising the steps of:

forming a transparent electrode on a substrate;
forming a black matrix layer on the transparent electrode;
depositing a photosensitive material on the black matrix layer to form a photosensitive layer;
patterning the photosensitive layer to mask the black matrix layer and to form a protrusion; and
etching the black matrix layer using the patterned photosensitive layer and the protrusion as mask."

Shimizu discloses steps of forming the black matrix 2b on the substrate 1; forming the color filters 2a on the substrate 1 between the black matrix 2b; and forming the transparent electrode 2c on the black matrix 2b and the color filter 2a. Shimizu does not disclose "forming a black matrix on the transparent electrode" because the transparent electrode 2c is formed on the black matrix 2b. Also, Shimizu fails to disclose "patterning the photosensitive layer to mask the black matrix layer and to form a protrusion; and etching the black matrix layer using the patterned photosensitive layer and the protrusion as mask".

Akiyama discloses forming a transparent signal electrode 63a on the substrate 62a. However, Akiyama does not disclose or suggest "forming a black matrix on the transparent electrode" and "patterning the photosensitive layer to mask the black matrix layer and to form a protrusion; and etching the black matrix layer using the patterned photosensitive layer and the protrusion as mask".

Matsuyama discloses steps of forming the black matrix BM on the substrate SUB 2; forming color filters FIL on the substrate SUB2 between the black matrix BM; forming a passivation layer PSV 2 over the color filters FIL and the black matrix BM; and forming an ITO layer ITO 2 on the passivation layer PSV 2. However, Matusyama fails to disclose or suggest "forming a black matrix on the transparent electrode" and "patterning the photosensitive layer to

mask the black matrix layer and to form a protrusion; and etching the black matrix layer using the patterned photosensitive layer and the protrusion as mask".

Since none of the cited references discloses or suggests these claimed features, it is submitted that claim 7 is patentable over them. Claims 8 and 9 that are dependent from claim 7 would be also patentable at least for the same reason. Accordingly, Applicants respectfully request withdrawal of the 35 U.S.C. § 103(a) rejection of claims 7-9.

Claims 25, 26, 28, 29, 32, 33, 35 and 37 stand rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over Shimizu in view of U. S. Patent No. 5,784,133 issued to Kim, et al. ("Kim") and further in view of U. S. Patent No. 6,433,852 issued to Sonoda, et al. ("Sonoda"). This rejection is respectfully traversed.

With respect to claims 25, 26, 28 and 29, amended independent claim 25 recites:

> "25. A liquid crystal display (LCD) device, comprising:
> a first substrate;
> a color filter formed on the first substrate;
> a black matrix formed on the first substrate and surrounding a pixel region; and
> a protrusion formed on the color filter within a pixel region,
> wherein the black matrix and the protrusion are formed of the same material."

For example, Fig. 1 of the present application shows the color filter 210 formed on the substrate 200. The black matrix is formed on the substrate 200 and surrounding the pixel region. The protrusion 230 is formed on the color filter within the pixel region. The black matrix and the protrusion 230 are formed of the same material.

Shimizu discloses the color filter 21 and the black matrix 2b formed on the substrate 1. However, Shimizu does not disclose or suggest "a protrusion formed on the color filter within a pixel region, wherein the black matrix and the protrusion are formed of the same material", as claimed.

Kim discloses a black matrix 45 formed on the data line 43 and the source/drain electrodes 42 of the TFT substrate 31. Since the black matrix 45 is formed on the TFT substrate, not a color filter substrate, Kim would not be able to disclose "a protrusion formed on the color filter within a pixel region, wherein the black matrix and the protrusion are formed of the same material".

Sonoda discloses, in Fig. 2, the black matrix BM formed on the color filter substrate SUB 2. The color filters FIL are formed on the black matrix BM and the color filter substrate SUB 2. The overcoat layer OC is formed on the color filter FIL, and the protrusion SP1 is formed on the overcoat layer OC.

However, the protrusion SP1 is not formed within a pixel region because the protrusion SP1 is formed over the black matrix BM. Thus, Sonoda fails to disclose or suggest "a protrusion formed on the color filter *within a pixel region*". Also, Sonoda is silent as to whether the black matrix BM and the protrusion SP1 are formed of the same material or not. Thus, Sonoda fails to disclose "the black matrix and the protrusion are formed of the same material".

As such, none of the cited references discloses or suggest "a protrusion formed on the color filter within a pixel region, wherein the black matrix and the protrusion are formed of the same material". Thus, it is submitted that claim 25 is patentable over them. Claims 26, 28, 29 and 31 are dependent from claim 25 and hence would be patentable at least for the same reason.

With respect to claims 32, 33, 35, 37 and 38, amended independent claim 32 recites:

> "32. A method for manufacturing a liquid crystal display (LCD) device, the method comprising steps of:
> defining portions of a substrate corresponding to a pixel region and a protrusion region arranged within the pixel region;
> forming a color filter layer on a substrate;
> forming a black matrix layer on the color filter layer; and
> etching the black matrix layer to form a protrusion on the protrusion region."

In this regard, none of the cited references discloses or suggest (a) defining a protrusion region arranged within the pixel region, and (b) etching the black matrix layer to form a protrusion on the protrusion layer.

Specifically, in Shimizu, the black matrix 2b is not formed on the color filter layer 2a. Thus, Shimizu fails to disclose or suggest "forming a black matrix layer *on* the color filter layer; and etching the black matrix layer to form a protrusion on the protrusion region".

In Kim, the black matrix layer 45 is formed on the TFT substrate, not on the color filter substrate. Thus, Kim fails to disclose or suggest "forming a black matrix layer *on* the color filter layer; and etching the black matrix layer to form a protrusion on the protrusion region".

In Sonoda, the color filter FIL is formed on the black matrix BM, thereby failing to disclose or suggest "forming a black matrix layer *on* the color filter layer". Also, in Sonoda, the pixel region is defined by the black matrix BM. The black matrix BM is not part of the pixel region. The protrusion SP1 is formed on the black matrix BM. Neither the black matrix BM nor the protrusion SP 1 formed on the protrusion region, which is arranged within the pixel region. Thus, Sonoda fails to disclose or suggest "forming a black matrix layer *on* the color filter layer; and etching the black matrix layer to form a protrusion on the protrusion region".

For these reasons, it is submitted that claim 32 is patentable over the cited references. Claims 33, 35, 37 and 38 are dependent from claim 32 and hence would be also patentable at least for the same reason. Accordingly, Applicants respectfully request withdrawal of the 35 U.S.C. § 103(a) rejection of claims 25, 26, 28, 29, 32, 33, 35 and 37.

Other Matters

In this response, claim 25 has been amended to avoid ambiguity by replacing "a black matrix formed on *the color filter*" with --a black matrix formed on *the first substrate*--. Fig. 1 shows the black matrix surrounding the pixel region and partially overlapping the color filter 210. However, one may argue that the black matrix surrounding the pixel region is not formed on the color filter because they are merely overlapping each other at their ends. To clarify this, claim 25 has been amended to recite --a black matrix formed on the first substrate--.

Claim 32 has been amended to correct an error because "the electrode" has never been mentioned previously.

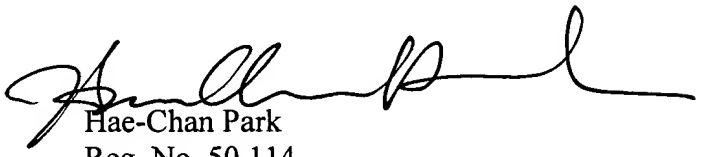
CONCLUSION

Applicants believe that a full and complete response has been made to the pending Office Action and respectfully submits that all of the stated grounds for rejection have been overcome or rendered moot. Accordingly, Applicants respectfully submit that all pending claims are allowable and that the application is in condition for allowance.

Should the Examiner feel that there are any issues outstanding after consideration of this response, the Examiner is invited to contact the Applicants' undersigned representative at the number below to expedite prosecution.

Prompt and favorable consideration of this Reply is respectfully requested.

Respectfully submitted,



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